

Descriptions and records of the genus *Diplurodes* Warren (Geometridae, Ennominae) from the Philippines¹

Rikio SATO

2-27-29 Shindori-nishi, Niigata, 950-2036 Japan

Abstract Twelve species of the genus *Diplurodes* are recorded from the Philippines. Nine of them are new species and the others are newly recorded.

Key words *Diplurodes*, Boarmiini, Geometridae, new species, new records, Philippines.

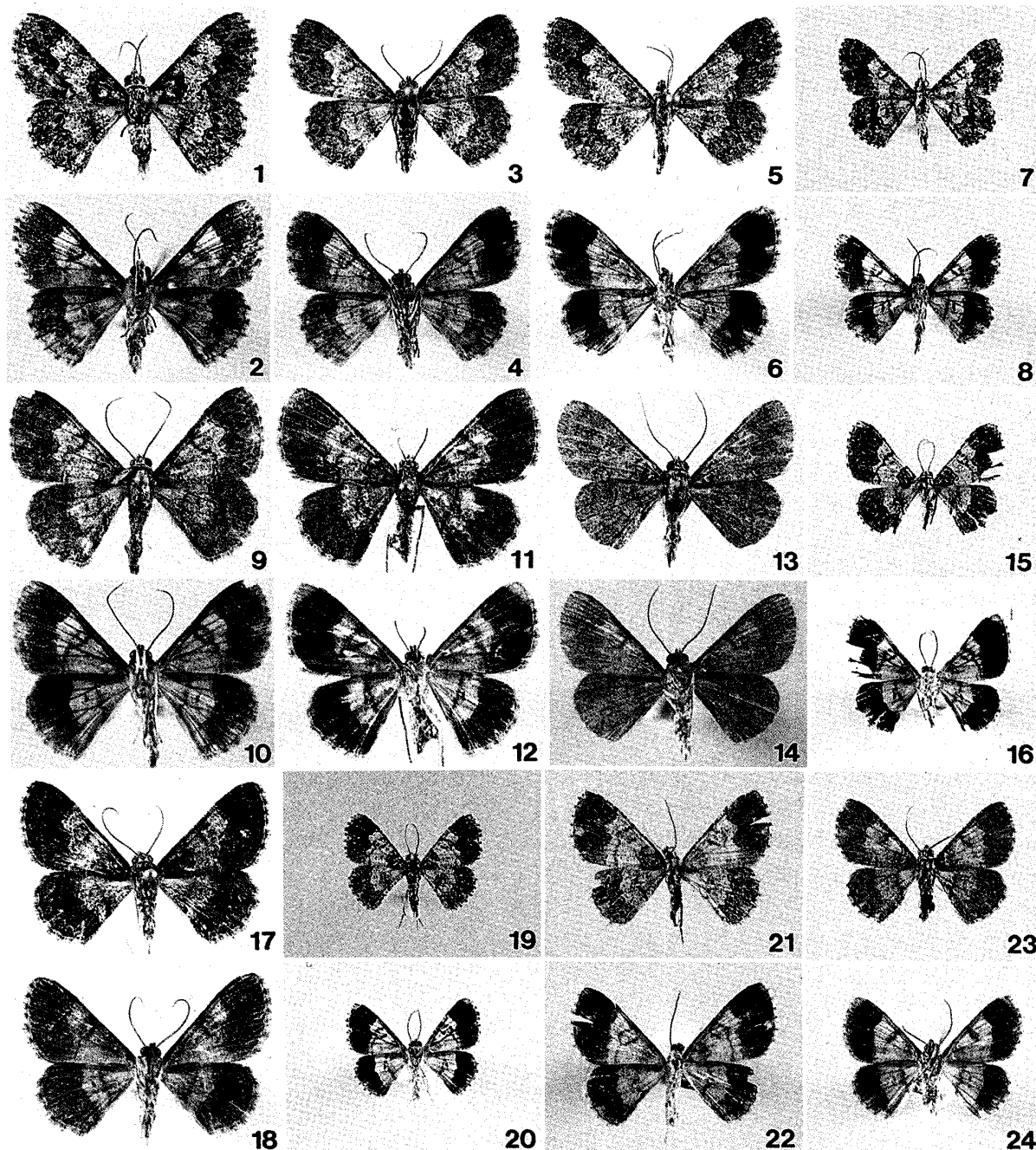
Diplurodes is a monobasic genus described by Warren (1896) for the single species *D. vestita* from the Khasia Hills in India. Later some new species were added to *Diplurodes* from the Indo-Malayan subregion, and some species from various genera were transferred to *Diplurodes* on the basis of characteristics in the abdominal segments and the genitalia in the male. But there had been some confusion in the systematic treatment of *Diplurodes* and its allied genera until Holloway (1993) gave a strict definition of the genus, *Diplurodes* and the other three known genera, *Myrioblephara* Warren, *Necyopa* Walker and *Ectropidia* Warren. In addition he established three new genera, *Chrysoblephara*, *Satoblephara*, *Nigriplephara*, to receive species excluded from *Diplurodes*.

According to Holloway (1993), the genus *Diplurodes* is defined by the following characteristics of the male: “strong pairs of coremata between segments 4 and 5, and 7 and 8; a setose, tongue-like process arising as a sort of pseudouncus from the tegumen; gnathus with a broad, tongue-like distal portion densely covered with pale weak spines; a weak costa to the valve, the lamina of which is often crinkled; a single basal sacculus process, digitate, bearing a robust spine at its apex; a narrow juxta that fuses with the vinculum and extends beyond it as a slender rod”. In particular the gnathos and coremata features are characteristic of *Diplurodes* and effectively used to distinguish it from the other related genera. The genus *Diplurodes* contains extremely variable and similar species and it is not easy to identify each species only by size, colour and maculation. The most useful and reliable diagnostic characteristics are found in the male abdomen and the genitalia of both sexes.

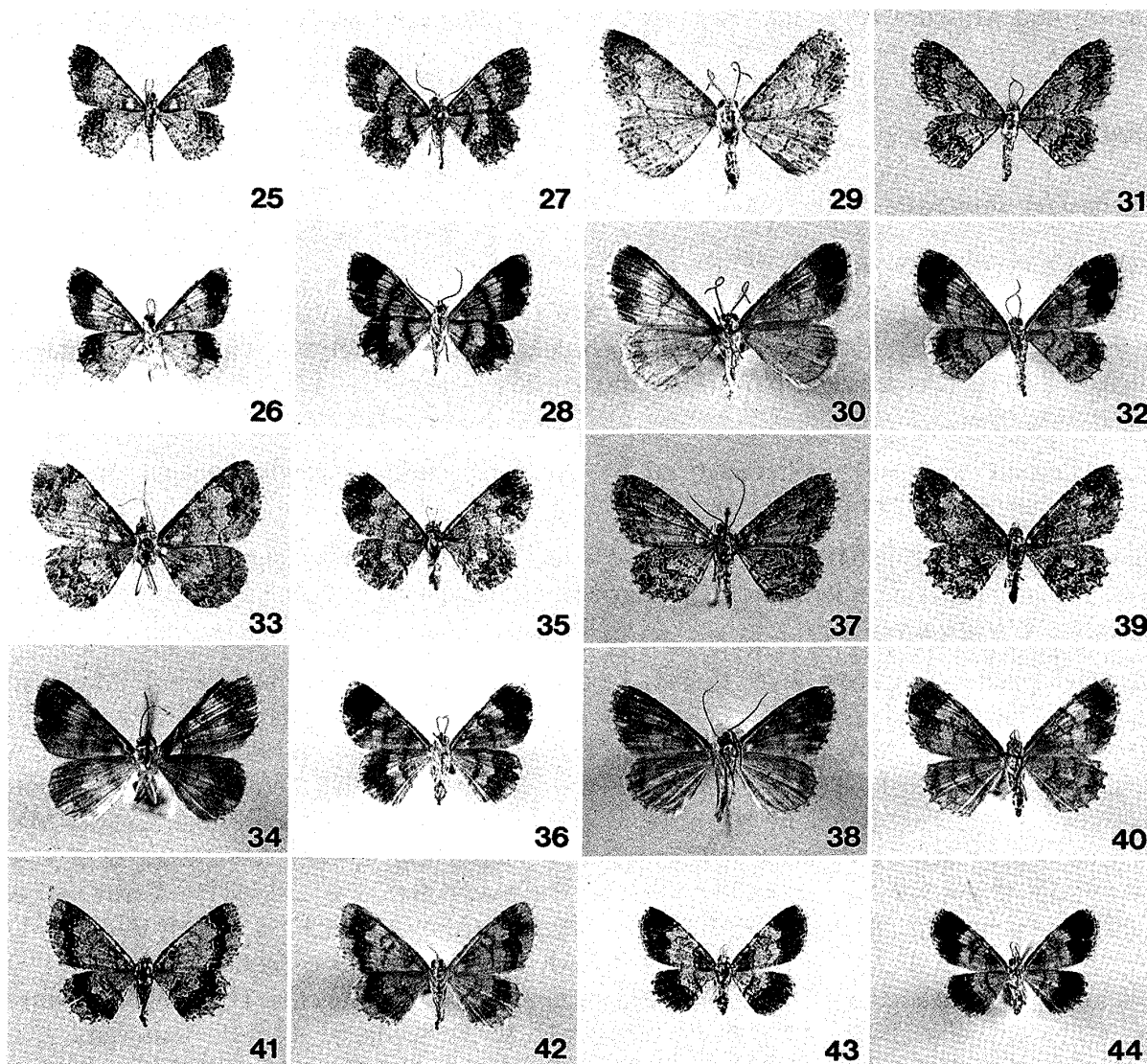
From the Philippines, two species were described as *Diplurodes* by me (Sato, 1990): one is *D. karsholti* from Palawan and the other *D. luzonensis* from Luzon. Both species are closely related to *parvularia* (Leech) from Japan, and have already been transferred to *Satoblephara* along with the type species *D. parvularia* by Holloway (1993) in his original description. Therefore, we have no records of *Diplurodes* from the Philippines to date.

In this paper twelve species of *Diplulodes* will be treated. Nine of them are new species and the others are newly recorded from the Philippines. Some species remain undescribed, because of lack of male specimens. A taxonomic study on the related three genera, *Myrioblephara*, *Ectropidia* and *Nigriplephara*, from the Philippines is under preparation by me. The materials in ZMC were supplied by the Danish Noona Dan Expedition in 1961

¹ This study is supported in part by the Grants-in Aid for Overseas Scientific Research Nos 60041078 and 61043074 from the Ministry of Education, Science and Culture, Japan.



Figs 1-24. *Diplurodes* spp. 1-2. *D. inundata* Prout. Negros. 3-6. *D. schintlmeisteri* sp. nov. (3-4. Holotype, ♂, Mindanao, ZFMK. 5-6. Paratype, ♀, Mindanao, NIAES). 7-8. *D. vermoleni* sp. nov. Holotype, ♂, Mindanao, NIAES. 9-12. *D. spinivalva* sp. nov. (9-10. Holotype, ♂, Mindanao, NIAES. 11-12. Paratype, ♀, Mindanao, NIAES). 13-14. *D. negrosana* sp. nov. Holotype, ♂, Negros, NIAES. 15-16. *D. vermoleni* sp. nov. Paratype, ♀, Mindanao, NIAES. 17-18. *D. lativalva* sp. nov. Paratype, ♂, Mindanao, ZFMK. 19-22. *D. tanakai* sp. nov. (19-20. Paratype, ♂, Mindanao, NIAES. 21-22. Paratype, ♀, Mindanao, ZFMK). 23-24. *D. semicircularis* Holloway. ♂, Palawan.



Figs 25–44. *Diplurodes* spp. 25–28. *D. sinecoremata* Holloway (25–26. ♂, Mindanao. 27–28. ♀, Mindanao). 29–32. *D. mindana* sp. nov. (29–30. Holotype, ♂, Mindanao, NIAES. 31–32. Paratype, ♀, Mindanao, NIAES). 33–36. *D. subdecursaria* sp. nov. (33–34. Holotype, ♂, Luzon, NIAES. 35–36. Paratype, ♀, Luzon, NIAES). 37–44. *D. luzonica* sp. nov. (37–38. Holotype, ♂, Luzon, ZFMK. 39–44. Paratypes, ♀, Luzon, NSMT).

and 1962, whose details were given by Petersen (1966), with special reference to entomology, and those in ZFMK were taken by Dr Schintlmeister and/or his colleagues during the collecting expeditions to the Philippines in 1988 and 1993, of which accounts were given by Schintlmeister (1993).

All the specimens including the type material recorded in this paper will be deposited in the National Institute of Agro-Environmental Sciences (NIAES), Tsukuba, Japan, except where indicated to the contrary.

The following abbreviations are used to indicate the location of specimens. BMH: Bishop Museum, Honolulu. NSMT: National Science Museum, Tokyo. NIAES: National Institute of Agro-Environmental Sciences, Tsukuba, Japan. ZFMK: Zoologisches Forschungs-

institut und Museum Alexander Koenig, Bonn. ZMC: Zoological Museum, Copenhagen, Denmark.

Diplurodes Warren

Diplurodes inundata Prout (Figs 1-2)

Diplurodes inundata Prout, 1929: 74.

This species was described from Peninsular Malaysia by Prout (1929), and was re-described including the characteristics of the male genitalia based on Bornean material (Holloway, 1993). The female genitalia have not hitherto been illustrated. It is newly recorded from the Philippines.

Male genitalia (Fig. 45). Characterized by two long, straight, slender saccular processes. Also shown by Holloway (1993, fig. 555).

Female genitalia (Fig. 63). Ostium bursae widely and uniformly sclerotized, longer than wide; bursa copulatrix sclerotized in U-shape posteriorly, with a large bowl-like signum near posterior sclerotization.

Material examined. Luzon. 3 ♂, Ifugao, Jacmal Bunhian 800-1,000 m, 24 km E Mayoyao, 11-13. v. 1967 (H. M. Torrevillas), BMH; 1 ♂, Ifugao, Banawe 3,550 feet Ca, 1. v. 1957, ZMC; 1 ♀, Ifugao, Banaue 1,200 m, 20 km N Lagawe, 22. ix-16. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK, 1 ♂ 2 ♀, *ditto*, x. 1988-i. 1989 (T. and F. Vermolen); 1 ♀, Nueva Vizcaya, Dalton Paß, Santa Fe 800 m, 17. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK. Negros. 12 ♂, Mt Canlaon, x. 1995, 6 ♂ 2 ♀, *ditto*, viii. 1995. Mindanao. 2 ♂ 1 ♀, Bukidnon, 40 km NW Maramag, Dalongdong, Talakag 800 m, 1-3. x. 1988 (K. Cerny and A. Schintlmeister), 1 ♀, *ditto*, 31. xii. 1991-2. i. 1992 (K. Cerny), ZFMK; 4 ♂, Mt Busa, 10-17. vi. 1997 (native collector); 3 ♂, S. Cotabato, Mt Matutum, v. 1996 (native collector); 1 ♀, Bukidnon, Mt Kitanglad, iv. 1997 (native collector); 1 ♂, Misamis Or., Hindangon 20 km S of Gingoog, 600-700 m, 20-24. iv. 1960 (H. M. Torrevillas), BMH. Palawan. 1 ♀, Mantalingajan, Tagembung 1,150 m, 18. ix. 1961, Noona Dan Exp. 61-62, ZMC.

Geographical range. Luzon, Negros, Mindanao, Palawan; Peninsular Malaysia, Borneo, Sumatra, Java.

Diplurodes schintlmeisteri sp. nov. (Figs 3-6)

Length of forewing 13-14 mm. Similar to *inundata*. Both wings with less contrast between dark and pale areas, while in *inundata* "the basal half of the hindwing and the medial zone of the forewing predominantly white" (Holloway, 1993); dorsal dark areas of both wings brownish grey, not irrorated with white; postmedial line more strongly angled beyond cell on forewing and less wavy on hindwing than in *inundata*; longitudinal bar centrally placed between the postmedial and submarginal lines always lacking, while in *inundata* varying from well developed to vanished; underside of wings without any reliable differences between the two species.

Male genitalia (Fig. 47). Similar to those of *inundata*. Tongue-like process from tegumen absent, while in *inundata* developed; costa more strongly sclerotized; sacculus wider and longer with a single sinuous process, apically more darkly sclerotized (in *inundata* sacculus with two long straight spine-like processes).

Female genitalia (Fig. 64). Ostium bursae wider than length with parallel sides; bursa copulatrix more swollen than in *inundata*, posterior quarter sclerotized and ribbed, with a large bowl-like signum at middle.

Holotype. ♂. "Philippinen Mindanao Bukidnon, Mt. Kitanglad S-Seite, Primärwald 1,700 m VIII. 1993, 8°07'N Breite 124°55'E Länge, leg. V. Sinjaev ex Coll. Schintlm.", ZFMK. Paratypes. Luzon. 1 ♀, Ifugao, Banaway 1,200 m, x. 1988–i. 1989 (T. and F. Vermolen); 3 ♀, *ditto*, 11–12. v. 1986 (native collector); Mountain Prov., Mt Pugu 1,900 m, 18. vii. 1985 (M. Owada), NSMT; 1 ♀, *ditto*, 9–13. ii. 1988 (K. Cerny and A. Schintlmeister), ZFMK. Negros. 1 ♂, Mt Canlaon, 850 m, 29. iv. 1997 (B. Tanaka); 4 ♂ 3 ♀, *ditto*, x. 1995 (native collector). Mindanao. 1 ♂, Davao, Upper Baracatan, Apo Range, Mt Talomo 1,100 m, 3–6. viii. 1985 (M. Owada), NSMT; 1 ♀, Bukidnon, Dalongdong, Talakag 800 m, 1–3. x. 1988, 3 ♂ 4 ♀, *ditto*, 31. xi. 1991–2. i. 1992 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂ 1 ♀, Bukidnon, Mt Kalatungan, Mt Bagonsilang 1,450 m, 30. xii. 1991, 2 ♂, *ditto* 1,250 m, 29. xii. 1991 (K. Cerny), ZFMK; 9 ♂ 3 ♀, Bukidnon, Mt Kitanglad 1,700 m, viii. 1993 (V. Sinjaev), ZFMK; 1 ♂ 1 ♀, Bukidnon, Mt Kitanglad, data unknown (native collector); 1 ♂ 1 ♀, S. Cotabato, Mt Matutum, x. 1995 (native collector); 4 ♀, *ditto*, v. 1996 (native collector).

Geographical range. Luzon, Negros, Mindanao.

***Diplurodes vermoleni* sp. nov.** (Figs 7–8, 15–16)

Length of forewing 12–14 mm. Similar to the previous two species. Variable in colour and maculation. In most specimens, medial area of forewing and basal area of hindwing paler than the rest, as in *inundata*; postmedial line weakly angled as in *inundata* on forewing, almost even as in *schintlmeisteri* on hindwing; medial line developed in medial pale area on forewing; discocellular spot of hindwing not roundish but short streak.

Male genitalia (Fig. 46). Very similar to those of *schintlmeisteri*, but distinguished from it by weak tongue-like process from tegumen, shorter sacculus with more sinuous process. Also similar to those of *vestita*, which have two saccular processes, one a sinuous process and the other a short triangular one from basal part of the former.

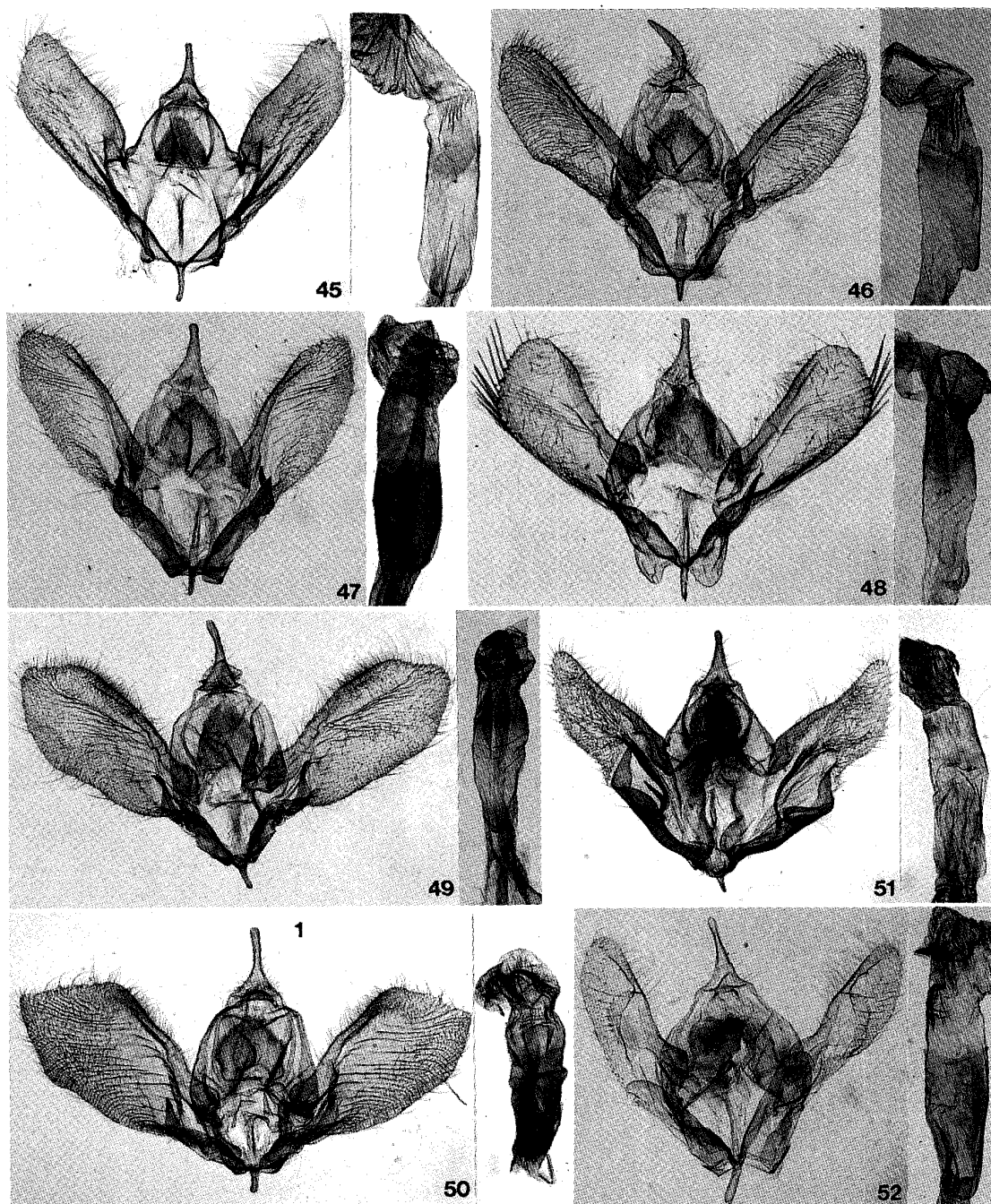
Female genitalia (Fig. 65). Similar to those of *schintlmeisteri*. Ostium bursae tapered anteriorly, heavily sclerotized laterally, with a pair of roundish sclerotizations posteriorly; bursa copulatrix swollen as in *schintlmeisteri*, posterior sclerotized area not ribbed and smaller, bearing a much smaller signum posteriorly.

Holotype. ♂. Mindanao, Mt Busa, x. 1996 (native collector). Paratypes. Luzon. 2 ♀, Ifugao, 20 km N. Lagawe, Banaway 1,200 m, x. 1988–i. 1989 (T. and F. Vermolen). Mindanao. 1 ♂, Bukidnon, 45 km NE Maramag, Mt Binansilang 1,200 m, 2. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂, Bukidnon, 15 km NW Maramag, Mt Kalatungan 1,250 m, 29. xii. 1991 (K. Cerny), ZFMK; 1 ♀, Mt Busa, x. 1996 (native collector).

Geographical range. Luzon, Mindanao.

***Diplurodes spinivalva* sp. nov.** (Figs 9–12)

Length of forewing 15–17 mm. The largest species of *Diplurodes* from the Philippines. The contrast between dark and pale areas developed; dark area uniformly grey with whitish submarginal line, pale area with medial line and grey irroration; postmedial line on forewing angled beyond cell and between veins CuA₁ and CuA₂.



Figs 45-52. Male genitalia of *Diplurodes* spp. 45. *D. inundata* Prout. Mindanao. RS-5441. 46. *D. vermoleni* sp. nov. Mindanao. RS-4237. 47. *D. schintlmeisteri* sp. nov. Negros. RS-5267. 48. *D. spinivalva* sp. nov. Leyte. RS-5269. 49. *D. lativalva* sp. nov. Mindanao. RS-5271. 50. *D. negrosana* sp. nov. Negros. RS-5266. 51. *D. tanakai* sp. nov. Negros. RS-5323. 52. *D. semicircularis* Holloway. Palawan. RS-5309.

Male genitalia (Fig. 48). Similar to those of the previous two new species, but can be easily distinguished by some strong spines from distal margin of valva. In addition, valva rhomboid in shape rather than lenticular as in the previous two species; saccular process longer and slender, not sinuous.

Female genitalia (Figs 67–69). Ostium bursae longer than wide, both sides with heavily sclerotized lateral margins. Bursa copulatrix more slender than in the previous two new species, varying geographically in the whole shape, especially in the development of posterior sclerotized and ribbed portion; a bowl-like signum a little smaller than in *schintlmeisteri*, located anteriorly.

Holotype. ♂. Mindanao, Mt Busa, x. 1996 (native collector). Paratypes. Luzon. 1 ♂, Quezon Forest Nat. Park 250 m, 8–10. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 3 ♀, Dalton-Paß Santa Fe 800 m, 21. ix–17. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂, Ifugao, Banaue 1,200 m, 8–12. ii. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♀, Banaway, 11–12. v. 1986 (native collector); 1 ♀, Camarines Sur, Mt Isarog 1,600 m, 21–22. v. 1963 (H. M. Torrevillas), BMH Leyte. 1 ♂ 1 ♀, 25–29. iii. 1995 (native collector), 1 ♀, 30. xi. 1984 (native collector). Negros. 2 ♀, Mt Canlaon, x. 1995 (native collector). Mindanao. 1 ♂, Bukidnon, Mt Kitanglad 1,200 m, viii. 1993 (V. Sinjaev), ZFMK; 12 ♂ 3 ♀, Mt Busa, x. 1996 (native collector); 2 ♂ 2 ♀, *ditto*, 10–17. vi. 1997 (native collector); 3 ♀, S. Cotabato, Mt Matutum, data unknown (native collector).

Geographical range. Luzon, Leyte, Negros, Mindanao.

***Diplurodes lativalva* sp. nov.** (Figs 17–18)

Length of forewing 14–17 mm. Variable in intensity of markings. Generally both wings dark grey without distinct contrast between dark and pale areas, in some specimens showing strong contrast between them or blackish bands following postmedial lines; postmedial lines on both wings as in *schintlmeisteri*; underside marked as in *inundata* and *schintlmeisteri*, but much paler, especially distal dark areas.

Male genitalia (Fig. 49). Similar to those of the previous three new species. Valva broader; tongue-like process of tegumen longer; medial spinous part of gnathos longer; sacculus shorter; saccular process more robust, apically more strongly sclerotized.

Female genitalia (Fig. 70). Similar to those of *spinivalva*. Ostium bursae broader, lateral sclerotized margins wider; bursa copulatrix more swollen with a bowl-like signum at middle.

Holotype. ♂. Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995 (native collector). Paratypes. 3 ♂ 1 ♀, Bukidnon, Mt Kitanglad 1,700 m, viii. 1993, 2 ♂ 1 ♀, *ditto* 2,200 m, viii. 1993 (V. Sinjaev), ZFMK; 2 ♂ 1 ♀, Bukidnon, 15 km NW Maramag, Mt Kalatungan, Mt Bagonsilang 1,450 m, 30. xii. 1991 (K. Cerny), ZFMK; 2 ♂ 1 ♀, Mt Kitanglad, 4. i. 1995 (native collector), 5 ♂, *ditto*, data unknown (native collector).

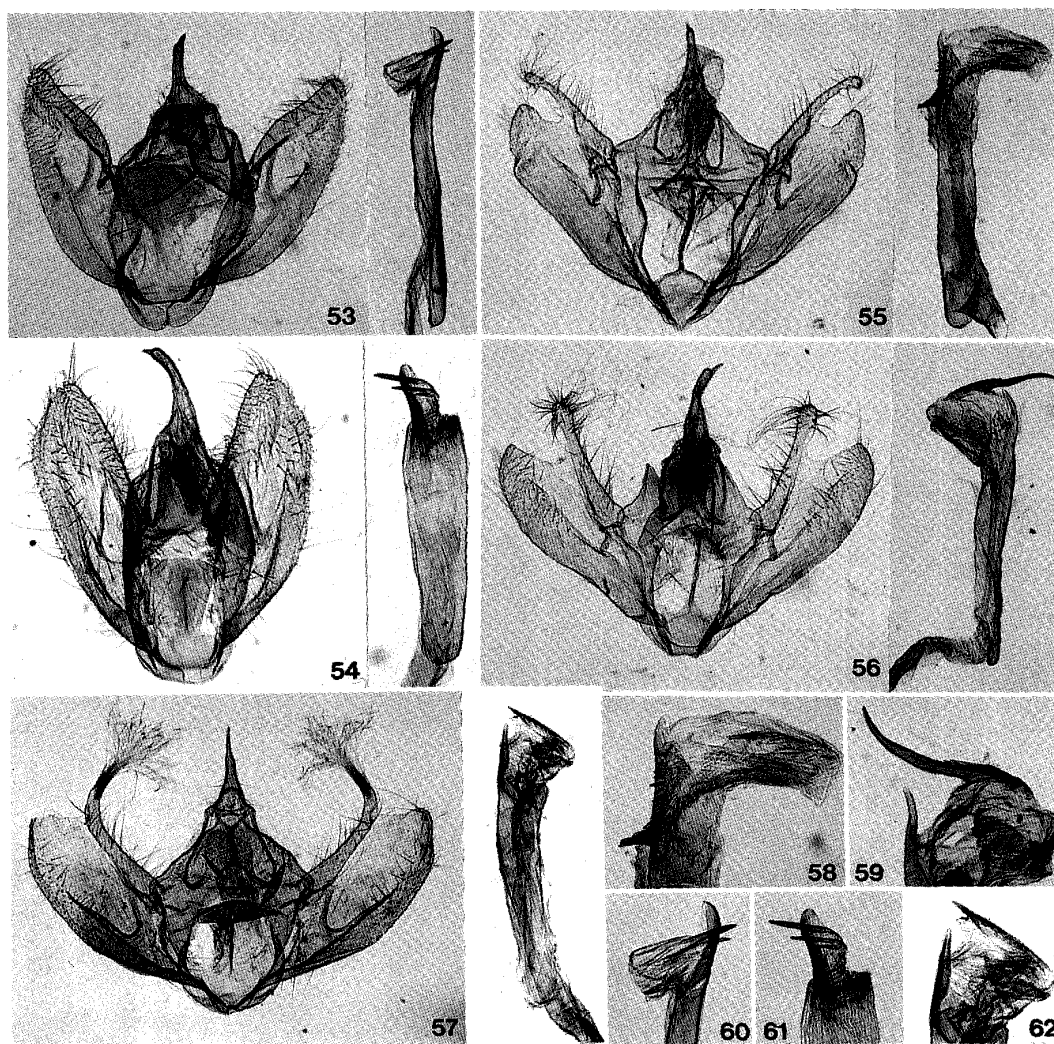
Geographical range. Mindanao.

***Diplurodes negrosana* sp. nov.** (Figs 13–14)

Length of forewing 14–15 mm. Similar to *lativalva* in markings. Both wings uniformly pale brown not tinged with grey and black; underside with narrower distal dark areas. Female unknown.

Male genitalia (Fig. 50). Very similar to those of *lativalva*, but valva much broader, not tapered apicad; medial part of gnathos shorter; sacculus shorter with a single more robust process.

Holotype. ♂. Negros. Mt. Canlaon, data unknown (native collector). Paratypes. Negros.



Figs 53-62. Male genitalia of *Diplurodes* spp. 53. *D. sincoremata* Holloway. Mindanao. RS-5253. 54. *D. mindana* sp. nov. Mindanao. RS-5017. 55. *D. decursaria* (Walker). Borneo. RS-5304. 56. *D. subdecursaria* sp. nov. Negros. RS-5248. 57. *D. luzonica* sp. nov. Luzon. RS-5434. ZFMK. 58-62. Apical portion of aedeagus greatly magnified. 58. *D. decursaria* (Walker). Borneo. RS-5304. 59. *D. subdecursaria* sp. nov. Luzon. RS-5299. BMH. 60. *D. sincoremata* Holloway. Mindanao. RS-5253. 61. *D. mindana* sp. nov. Mindanao. RS-5013. 62. *D. luzonica* sp. nov. Luzon. ZFMK. RS-5434.

4 ♂, Mt. Canlaon, data unknown (native collector).

Geographical range. Negros.

***Diplurodes tanakai* sp. nov.** (Figs 19-22)

Length of forewing 11-13 mm. Somewhat similar to *vermoleni*, but a little smaller in size, and paler in colour. The contrast between dark and pale areas of both wings stronger; paler area wider, uniformly white, without blackish irroration.

Male genitalia (Fig. 51). Characterized by elongated sacculus with broad base. Saccular process strongly angled near base.

Female genitalia (Fig. 71). Ostium bursae funnel-shaped with lateral sclerotized margins. Bursa copulatrix bulbous, posterior fourth sclerotized and weakly ribbed, with no signum.

Holotype. ♂. Negros, Mt Canlaon 850m, 29. iv. 1997 (B. Tanaka). Paratypes. Luzon. Ifugao, Banaue 1,200 m, 8–12. ii. 1988 (K. Cerny and A. Schintlmeister), ZFMK. Mindanao. 2 ♂, Bukidnon, 40 km NW Maramag, Dalongdong, Talakag 800 m, 31. xii. 1991–2. i. 1992 (K. Cerny), ZFMK; 1 ♀, *ditto*, 1–3. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♀, Bukidnon, Mt Kitanglad 1,700 m, viii. 1993 (V. Sinjaev), ZFMK; 1 ♂, Mt. Busa, x. 1996 (native collector).

Geographical range. Luzon, Negros, Mindanao.

***Diplurodes semicircularis* Holloway (Figs 23–24)**

Diplurodes semicircularis Holloway, 1993: 264.

This species was described from Borneo by Holloway (1993). It is peculiar in having an additional pair of coremata between segments 3 and 4 in the male, and a semicircular plate on the valva in the male genitalia. It is new to the Philippines, and seems to be confined to Palawan and its nearby islands.

Male genitalia (Fig. 52). Holloway's description (1993) as follows. "The genitalia are distinguished by a broadly semicircular plate extending from the ventral edge of the valve costa. The saccular sclerotisation is distally rounded, unspined. The tongue-like process on the tegumen is weak".

Female genitalia (Fig. 66). Ostium bursae a little longer than wide, with sclerotized lateral margins. Bursa copulatrix swollen as in *schintlmeisteri* and its allies, but smaller as a whole, posterior fifth sclerotized and ribbed, a small signum at right side posteriorly.

Material examined. Palawan. 2 ♂, S. Vicente 400 m, 20 km NEE Roxas, 12. i–17. i. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♀, Mantalingajan, Pinigisan 600 m, 6. ix. 1961, Noona Dan Exp. 61–62; 1 ♂, Mantalingajan, Tagembung 1,150 m, 17. ix. 1961, Noona Dan Exp. 61–62, ZMC; 1 ♀, Mt Salakoti, 900ft, 19. iii. 1996 (R. Q. Rodrigues). Tawi Tawi. 1 ♀, Tarawakan, north of Batu Batu, 15. xi. 1961, Noona Dan Exp. 61–62, ZMC.

Geographical range. Palawan, Tawi Tawi; Borneo, Peninsular Malaysia, Sumatra.

***Diplurodes sincoremata* Holloway (Figs 25–28)**

Diplurodes sincoremata Holloway, 1993: 265.

This species was described from Borneo as a member of *Diplurodes*, though it has no coremata in the male abdomen. The other characteristics in the male genitalia almost agree with those of *D. decursaria* (Walker).

Male genitalia (Figs 53, 60). Holloway's description (1993): "The gnathus is typical of the genus. The uncus tapers gently rather than ending in a 'bird's head' as in *decursaria*. The vinculum is distally bilobed as in *decursaria*. The valve is regular in shape, only slightly sclerotised, and without distinctive ornamentation. The aedeagus apex is unspined but the reflexed vesica bears two directed spines near its base".

Female genitalia (Fig. 72). Ostium bursae glass-shaped, sclerotized posterior quarter forming colliculum. Bursa copulatrix not so swollen, posterior half lightly sclerotized and ribbed,

without signum.

Material examined. Luzon. 2 ♂, Banaway, 10. iv. 1986; 1 ♂ 1 ♀, *ditto*, 28. i. 1986; 8 ♂ 14 ♀, *ditto*, 11–12. v. 1986; 2 ♀, Ifugao, Banaue 1,200 m, vic. 20 km N. Lagawe, x. 1988–i. 1989 (T. and F. Vermolen); 1 ♂ 1 ♀, *ditto*, 9–12. ii. 1988, (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂, Ifugao, Mayoyao, 1,200–1,300 m, 12. vii. 1966 (H. M. Torrevillas); 2 ♀, *ditto*, 5–9. viii. 1966 (H. M. Torrevillas); 2 ♀, *ditto*, 10. viii. 1966 (H. M. Torrevillas), 1 ♀, *ditto*, 13–15. viii. 1966 (H. M. Torrevillas); 2 ♂, Ifugao, Liwo, 8 km E Mayoyao, 1,000–1,300 m, 29–30. v. 1967 (H. M. Torrevillas); 1 ♂, Camarines Sur, Mt Isarog, Pili 800 m, 29. iv. 1965 (H. M. Torrevillas), BMH. Negros. 2 ♂ 2 ♀, Mt Canlaon. Mindanao. 1 ♂, S. Cotabato, Mt Matutum; 2 ♀, Bukidnon, Mt Kitanglad, iv. 1997; 7 ♂, Mt Busa, x. 1996; 1 ♂ 1 ♀, Bukidnon, 40 km NW Meramag, Dalongdong, Talakag 800 m, 31. xii. 1991–2. i. 1992 (K. Cerny), ZFMK; 1 ♂, Bukidnon, 15 km NW Maramag, Mt Kalatungan/Mt Bagonsilang 1,250 m (K. Cerny), ZFMK; 1 ♂, Davao, Upper Baracatan, Apo Range, Mt Talomo 1,100 m, 3–6. viii. 1985 (M. Owada); 1 ♂, *ditto*, 17–19. viii. 1985 (M. Owada), NSMT. 1 ♀, Misamis Or., Mt Kibungol, 20 km SE of Gingoog, 700–800 m, 9–18. iv. 1960 (H. M. Torrevillas), BMH. Palawan. 1 ♂, Mantalingajan, Pinigisan 600 m, 6. ix. 1961, Noona Dan Exp. 61–62; 1 ♂ 1 ♀, Mantalingajan, Tagembung 1,150 m, 18. ix. 1961, Noona Dan Exp. 61–62, ZMC; 1 ♂, 10. v. 1986; 1 ♀, 30. i. 1986.

Geographical range. Luzon, Negros, Mindanao, Palawan; Borneo, Sumatra.

***Diplurodes mindana* sp. nov.** (Figs 29–32)

Length of forewing 13–14 mm. Similar to *sinecoremata*, but can be easily distinguished from it in the following. Both wings much paler, almost uniformly white, while in *sinecoremata* dorsal area generally dark grey, strongly marked, especially in female; forewing narrower with postmedial line more dentate; hindwing with discocellular spot less developed; underside much paler, marked as in *sinecoremata* on forewing, maculation lacking or very reduced on hindwing. In male abdomen coremata lacking as in *sinecoremata*.

Male genitalia (Figs 54, 61). Very similar to those of *sinecoremata*. Medial part of gnathos more slender; valva narrower, dorsal margin smooth, while in *sinecoremata* gently excurved; basal narrowly sclerotized band from costa to sacculus almost straight, while in *sinecoremata* gently curved near sacculus; aedeagus less slender.

Female genitalia (Fig. 73). Similar to those of *sinecoremata* in the shape of ostium bursae. Ostium bursae shorter; bursa copulatrix more slender without sclerotization nor ribbing; signum lacking.

Holotype. ♂. Mindanao, Bukidnon, Mt Kitanglad, 4. i. 1995 (native collector). Paratypes. Mindanao. 3 ♂, Bukidnon, Mt Kitanglad, 4. i. 1995 (native collector); 1 ♂, Bukidnon, 45 km NW Maramag, Mt Binansilang 1,200 m, 2. x. 1988, 1 ♀, *ditto*, 18. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 10 ♂, Mt Kitanglad 1,700 m, viii. 1993 (V. Sinjaev), ZFMK; 2 ♀, Bukidnon, 15 km NW Maramag, Mt Kalatungan, Mt Bagonsilang, 30. xii. 1991 (K. Cerny), ZFMK; Bukidnon, 40 km NW Maramag, Dalongdong, Talakag 800 m, 31. xii. 1991–2. i. 1992 (K. Cerny), ZFMK.

Geographical range. Mindanao.

***Diplurodes subdecursaria* sp. nov.** (Figs 33–36)

Length of forewing 11–12 mm. Similar to *decursaria* (Walker, 1862) from Borneo. Smaller in size (in *decursaria* forewing length 12–14 mm); postmedial line on forewing more strongly angled beyond cell and between veins CuA_1 and CuA_2 . Two pairs of abdominal coremata in male weakly developed as in *decursaria*.

Male genitalia (Figs 56, 59). Similar to those of *decursaria* (Figs 55, 58). Valva more widely cleft apically, producing more robust costal arm; sacculus indistinct, ventral margin of valva smooth, while in *decursaria* sacculus broadly sclerotized, making a small concavity at distal third; aedeagus without any ornamentation on surface but with a single long slender cornutus, basal half spined, on vesica, while in *decursaria* the aedeagus has a saw-like row of spines developed at apex and no cornutus (Holloway, 1993: 567).

Female genitalia (Figs 74, 75). Similar to those of *decursaria* (Fig. 76). Bursa copulatrix with a small projection at left side posteriorly, more weakly scobinate near posterior end of ostium bursae.

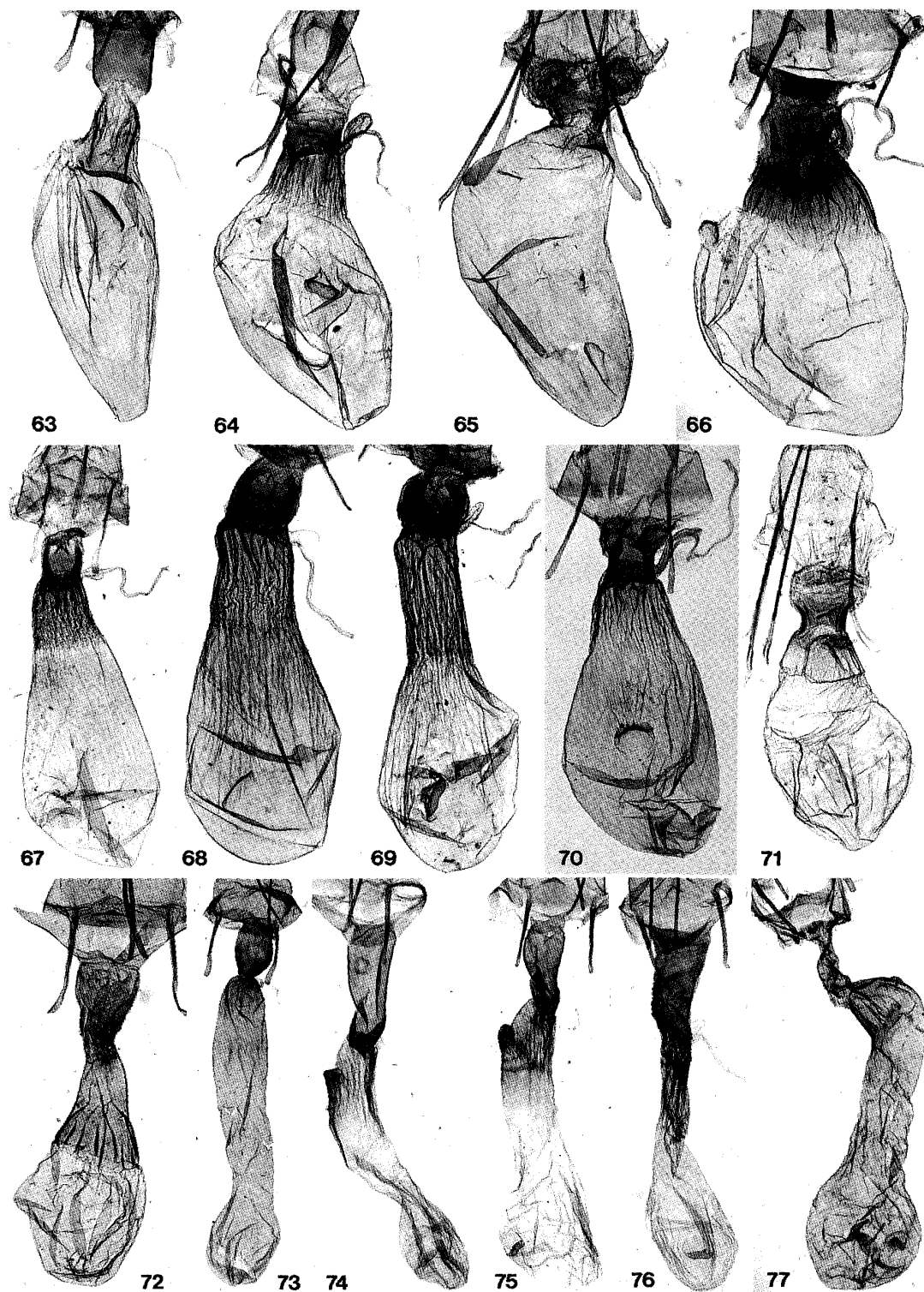
Holotype. ♂. Luzon, Banaway, 11–12. v. 1986 (native collector). Paratypes. Luzon. 9 ♀, Banaway, 11–12. v. 1986 (native collector); 1 ♀, *ditto*, 21. i. 1986 (native collector); Mountain Prov., Barlig 1,550 m, 17, 19. vii. 1985 (M. Owada), NSMT; 1 ♀, Banawe 3,550 feet, 1. vi. 1957 (Tage Ellinger), ZMC; 2 ♂, Banaue vic., 20 km N Lagawe 1,200 m, 22. ix–16. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂, Ifugao, Jacmal Bunhian 800–1,000 m, 24 km E Mayoyao, 11–13. v. 1967 (H. M. Torrevillas), BMH; 1 ♀, Ifugao, Mayoyao 1,200–1,500 m, 10. viii. 1966 (H. M. Torrevillas), BMH; 1 ♀, Camerines Sur, Mt Isarog 1,600 m, 21–22. v. 1963 (H. M. Torrevillas), BMH. Negros. 2 ♂ 2 ♀, Mt Canlaon, x. 1995 (native collector). Mindanao. 1 ♀, Davao, Upper Baractan, Apo Range, Mt Talomo 1,100 m, 3–6. viii. 1985 (M. Owada), NSMT; 1 ♂, Bukidnon, 40 km NW Maramag, Dalongdong, Talakag 800 m, 1–3. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 4 ♀, Bukidnon, Mt Kitanglad 1,700 m, viii. 1993 (V. Sinjaev), ZFMK; 2 ♀, Bukidnon, 15 km NW Maramag, Mt Kalatungan, Mt Bagonsilang 1,450 m, 30. xii. 1991, 1 ♂, *ditto* 1,250 m, 29. xii. 1991 (K. Cerny), ZFMK; 1 ♀, Bukidnon, 45 km NW Maramag, Mt Binansilang 1,200 m, 2. x. 1988, 1 ♀, *ditto*, 18. x. 1988 (Cerny and Schintlmeister), ZFMK.

Geographical range. Luzon, Negros, Mindanao.

***Diplurodes luzonica* sp. nov.** (Figs 37–44)

Length of forewing 13–16 mm. Somewhat similar to *subdecursaria*, but easily separable from it by narrower wings and the following characteristics. Variable in colour and markings. In general the contrast between dark and pale areas of both wings less developed, darker area not tinged with purple and paler one more densely irrorate with fuscous; in one female (Fig. 43) dark area almost uniformly greyish black, and in another female (Fig. 41) greyish black band produced outside postmedial line; underside paler. Abdominal coremata in male lacking as in *sinecoremata*.

Male genitalia (Figs 57, 62). Similar to those of *subdecursaria*. Uncus tapered to a pointed apex, not ended in a bird's head as in *subdecursaria*. Medial part of gnathos broader; valva less deeply cleft apically, costal process bearing numerous hairs; basal narrow band from costa to sacculus longer, incurved near sacculus; a single cornutus shorter and broader, more widely spined, with pointed apex.



Figs 63-77. Female genitalia of *Diplurodes* spp. 63. *D. inundata* Prout. Mindanao. RS-5459. 64. *D. schintlmeisteri* sp. nov. Mindanao. RS-5293. 65. *D. vermoleni* sp. nov. Luzon. RS-5274. 66. *D. semicircularis* Holloway. Palawan. RS-5468. 67. *D. spinivalva* sp. nov. Mindanao. RS-5265. 68. *Ditto*. Luzon. RS-5466. 69. *Ditto*. Negros. RS-5469. 70. *D. lativalva* sp. nov. Mindanao. RS-5272. 71. *D. tanakai* sp. nov. Mindanao. RS-5442. ZFMK. 72. *D. sinecoremata* Holloway. Luzon. RS-5254. 73. *D. mindana* sp. nov. Mindanao. RS-5440. 74. *D. subdecursaria* sp. nov. Mindanao. RS-5276. 75. *Ditto*. Luzon. RS-5258. 76. *D. decursaria* (Walker). Sumatra. RS-5306. 77. *D. luzonica* sp. nov. Luzon. RS-5432.

Female genitalia (Fig. 77). More similar to *mindana* than to *subdecursaria*, particularly in membranous ostium bursae with short colliculum. Ostium bursae more slender than in *mindana*; bursa copulatrix lightly sclerotized posteriorly with a small bowl-like signum, while in *mindana* bursa copulatrix membranous with no signum.

Holotype. ♂. "Philippinen, N. LUZON, Ifugao, Mt. Pulis, 16 km SSE Bontoc, 17°02'N 121°01'E Br., Nebelurwald, primär 1,900 m, 9. 2-13. 2. 1988, leg. Cerny and Schintlmeister", ZFMK. Paratypes. Luzon. 1 ♀, Ifugao, 22 km SE Bontoc, Mt Amuyao 2,450-2,700 m, 15-17. ii. 1988 (K. Cerny and A. Schintlmeister), ZFMK; 1 ♂, Ifugao, 15 km SE Bontoc, Chatol 1,600 m, 24. ix. and 14. x. 1988 (K. Cerny and A. Schintlmeister), ZFMK. 3 ♀, Mountain Prov., Barlig 1,550 m, 17, 19. vii. 1985 (M. Owada), NSMT; 7 ♀, Mountain Prov., Mt Puguis 1,900 m, 18. vii. 1985 (M. Owada), NSMT.

Geographical range. Luzon.

Acknowledgements

I would like to express my sincere appreciation to Dr D. Stüning, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Dr S. E. Miller, Department of Natural Science, Bishop Museum, Honolulu, Dr O. Karsholt, Zoological Museum, Copenhagen, and Dr M. Owada, National Science Museum, Tokyo, for their permission to study specimens under their curation. I deeply thank Dr H. Inoue, Prof. Emeritus of Otsuma Women's University, Iruma, for his critical reading of the early version of the manuscript and helpful advice. Thanks are also due to Dr A. Schintlmeister, Dresden, Messrs N. Bito, Nagoya, B. Tanaka, Toyota and K. Yazaki, Tokyo, for their kindness in offering material.

References

- Holloway, J. D., 1993. The moths of Borneo: family Geometridae, subfamily Ennominae. *Malay. Nat. J.* **47**: 1-309, pls 1-19, 593 figs.
- Petersen, B., 1966. The Noona Dan Expedition, 1961-62. Insects and other land arthropods. *Ent. Meddr.* **34**: 283-304.
- Prout, L. B., 1929. New species and sub-species of Geometridae. *Novit. zool.* **35**: 63-77.
- Sato, R., 1990. Descriptions of three new species allied to *Diplurodes parvularius* (Leech) (Geometridae, Ennominae) from Southeast Asia. *Tyô Ga* **41**: 7-12.
- Schintlmeister, A., 1993. Die Zahnspinner der Philippinen. Ergebnisse zweier Sammelreisen 1988 (Lepidoptera: Notodontidae). *Nachr. ent. Ver. Apollo* (N. S.) Suppl. **12**: 99-174.
- Warren, W., 1896. New Geometridae in the Tring museum. *Novit. zool.* **3**: 99-148.

摘 要

フィリピン産 *Diplurodes* 属 (シャクガ科エダシャク亜科) (佐藤力夫)

Diplurodes 属は、インドから記載された *vestita* Warren を模式種とし、インド・マレー地域を中心に多くの種が記載されたが、かなり異質な種も含まれていた。近年 Holloway (1993) によって、主としてボルネオの種を基にした再検討がおこなわれ、本属が明確に規定されるとともに、除外された種は他の既存の属へ移され、さらに *Chrysoblephara*, *Satoblephara*, *Nigriplephara* の3属が創設された。日本からは模式種 *vestita* ハラゲエダシャクと、*parvularia* Leech ハラゲチビエダシャクの2種が知られていたが、後者を模式種として *Satoblephara* が記載されたので、日本の *Diplurodes* は模式種のみ (日本産は ssp. *fuscovestita* Inoue) ということになる。

筆者は、Holloway (1993) の定義に従ってフィリピン産の *Diplurodes* を調べ、12種を確認することが

できたので、そのデータを記録するとともに、下記の9種を新種として記載した。なお、従来フィリピンから *Diplurodes* として記載された *karsholti* Sato (Palawan) と *luzonensis* Sato (Luzon) は、既に Holloway (1993) によって、*Satoblephara* に移行されている。

- D. schintlmeisteri* Sato (Luzon, Negros, Mindanao)
- D. vermoleni* Sato (Luzon, Mindanao)
- D. spinivalva* Sato (Luzon, Leyte, Negros, Mindanao)
- D. lativalva* Sato (Mindanao)
- D. negrosana* Sato (Negros)
- D. tanakai* Sato (Luzon, Negros, Mindanao)
- D. mindana* Sato (Mindanao)
- D. subdecursaria* Sato (Luzon, Negros, Mindanao)
- D. luzonica* Sato (Luzon)

今後、さらに近縁の属について研究を進めたい。

(Accepted April 19, 1999)